



U.S. Agency for International Development

Climate Change Initiative

Addressing Climate Change in Developing Countries and Countries with Economies in Transition – November 2000

The Challenge of Climate Change

Scientific evidence indicates that the 20th Century was the warmest century on record. Likewise, five of the warmest years in recorded history occurred in the 1990s. Consensus within the scientific community is emerging suggesting that greenhouse gas (GHG) emissions derived from human activities are causing global temperature to increase.¹ These greenhouse gases, which include carbon dioxide, methane, and nitrous oxide, have increased over the past century largely as a result of population growth, economic expansion, land use change, and the ever increasing consumption of fossil fuels that power the world's economies.

According to the U.S. Department of Energy, if consumption trends continue as projected, global carbon emissions from the burning of fossil fuels will rise from 6.3 billion metric tons² in 1999 to over 10 billion metric tons by 2020.³ According to recent findings by the Intergovernmental Panel on Climate Change (IPCC), by 2100, when atmospheric carbon dioxide concentrations could double, average global temperature is expected to rise by up to 6 degrees Celsius (11 degrees Fahrenheit) above 1990 levels.⁴

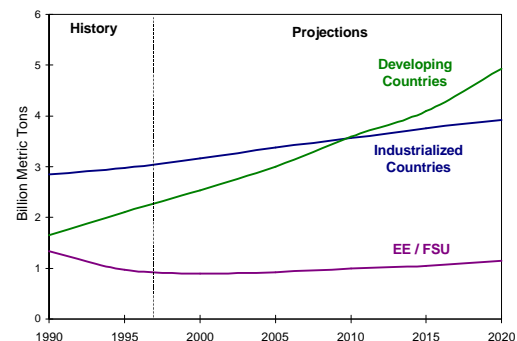
Even more troubling are concerns about the possible relationship between climate change, changing precipitation patterns, and the frequency and intensity of extreme weather events like hurricanes and typhoons, droughts, and floods. Estimates indicate weather-related damage in 1999 totaled \$67 billion worldwide. Likewise, weather-related damage in the 1990s increased fivefold from the previous decade. Though weather-related impacts are unpredictable and difficult to link directly to climate change—unlike gradual changes like temperature increase and sea level rise—it will be important to take steps to prepare for the potential impacts in developing countries. Many developing countries and countries in transition are already highly vulnerable to the affects of extreme weather events, floods, and drought, and any increases in frequency or severity of these impacts through climate change will further threaten developing country populations and economic development.

Emissions Projections. Industrialized countries bear the greatest responsibility for the historical buildup of GHGs and have per capita emissions that exceed those of developing countries. Rapid economic expansion in developing countries, however, has resulted in significant increases in greenhouse gas emissions.⁵ Developing countries alone will account for 79 percent of the projected increase in global carbon emissions between 1990 and 2020.⁶ By the year 2009, developing (non-Annex I) countries could surpass industrialized countries in emissions. (See Graph 1.) Even if

the Annex I countries were to adopt the terms of the Kyoto Protocol, continued heavy reliance on coal and other fossil fuels in developing countries will ensure that worldwide emissions would still grow substantially over the next century.⁷

While emissions have continued to grow for developing and industrialized countries, countries with economies in transition have been experiencing downward emissions trends, largely as a result of significant reductions in industrial output. Carbon emissions fell over 30 percent between 1990 and 1998 in these nations. While these reduced figures are favorable for climate change, transition economies remain among the world's most carbon-intensive. For example, Russia's carbon intensity — emissions generated per unit of output — is over six times that of the European Union.⁸

Graph 1. Projected carbon dioxide emissions trends for



developing countries, industrialized countries, and Eastern Europe/Former Soviet Union. Source: U.S. Department of Energy, International Energy Outlook 2000 (2000), <http://www.eia.doe.gov/oiaf/ieo/index.html>.

Climate Impacts for Developing Countries and Countries with Economies in Transition. Global climate change could substantially alter the hydrologic cycle. Precipitation patterns are expected to undergo significant shifts, resulting in more intense and frequent severe weather, flooding, and drought, as well as a rise in sea level. While some areas may benefit, the overall impacts are expected to be negative, particularly in developing countries.

As a result of climate change, agricultural areas may be subject to reduced rainfall or flooding, threatening food security and increasing poverty, land degradation, dislocation, and the possibility of civil conflict. Changing precipitation patterns may put freshwater resources at risk, and threaten biodiversity in sensitive ecosystems. Potential sea level rise puts two-thirds of the world's largest cities at risk. Storm surges could subject an additional 40 to 80 million people to flooding and property damage. The health impacts of climate

change could increase heat-related mortality, deaths caused by extreme weather events, and the incidence of diseases such as malaria and cholera.

Impacts will be particularly severe in poorer, developing and transition nations—especially in countries with dense populations, low-lying coastal areas, limited water resources, or economies that are highly dependent on natural resources and agriculture. Since these countries have the fewest economic resources, they often lack adequate means to prepare for crisis or adapt to change, making them more vulnerable to the risks and costs associated with climate change. Given the unpredictable nature of climate change and weather variability, it will be particularly important for the most vulnerable developing countries to be prepared for natural disasters and severe environmental stress.

The USAID Approach

The U.S. Agency for International Development (USAID) recognizes that global warming poses a tremendous threat to ecological balance and economic development worldwide, particularly for developing countries and countries with economies in transition. As the foreign assistance arm of the

Box 1. USAID's Parks-in-Peril Program

Since 1990, the Parks in Peril Program (PiP) — a partnership between USAID, The Nature Conservancy, and local NGOs — has become Latin America's largest, most successful site-based conservation effort. Working in 37 protected areas in 15 countries, PiP has helped protect over 11 million hectares of natural forests, of which 6.3 million contain substantial carbon stocks.

PiP supports local governments, NGOs, and communities by strengthening capacity to manage and conserve protected areas, providing technical research and manuals on conservation techniques and practices, and by supporting targeted policy reforms. The cornerstone of PiP has been working with local partners to develop technical and financial resources to ensure long-term self-sufficiency. Assistance has included strategic planning, ecological monitoring, financial accounting, GIS analysis, and community-based management. Many protected areas now no longer require intensive assistance, and enjoy on-site management, improved financing, and community support.

PiP has introduced over 140 policy interventions in a variety of areas, such as establishing resource-use fees to fund conservation, ecological corridors, private lands conservation, conservation easements, policy analysis, debt buy-back, and tax incentives. In Ecuador's Podocarpus National Park, for example, PiP supported a local beekeepers' association to assess a voluntary tax on their production. All revenue from this tax will be dedicated to park conservation.

PiP had also shown success in community resettlement, an important approach to conservation. PiP's partners worked with the Guatemalan government to help the Vega Larga community voluntarily resettle to a farm outside of the Sierra de las Minas Biosphere Reserve, allowing for the recovery of 1,350 hectares in one of the richest and most ancient cloud forests in the Reserve.

United States Government, USAID works collaboratively with these countries to promote sustainable development. Since 1990, efforts to address the causes and impacts of climate change have been a key focus of USAID's development assistance program.

In 1997, President Clinton reaffirmed the U.S. commitment to reduce the threat of climate change by announcing that the U.S. would spend \$1 billion over a 5-year period to work collaboratively with developing countries and countries with economies in transition. In fulfillment of the President's commitment, USAID initiated its Climate Change Initiative, an effort that involves 50 country and regional programs worldwide, promoting sustainable development that minimizes the associated growth in GHG emissions and reduces vulnerability to climate change impacts.

The USAID Climate Change Initiative focuses on four primary objectives:

- Increasing carbon storage through forestry and land use activities;
- Reducing net GHG emissions from the energy sector, industries, and urban areas;
- Strengthening participation in the goals of the United Nations Framework Convention on Climate Change (UNFCCC); and
- Reducing vulnerability to the threats posed by climate change.

Through its programs, USAID implements “win-win” solutions that provide climate-related benefits while meeting sustainable development objectives in forest conservation and sustainable agriculture, energy, urban and industrial development, pollution control, adaptation measures, and disaster preparedness and assistance. The Agency also plays an important role promoting the open and meaningful participation of developing and transition country partners in the UNFCCC.

The objectives of the Initiative are achieved through technical assistance, human and institutional capacity building, policy reform, technology cooperation, public-private partnerships, information sharing, and research. Across all regions and countries, USAID places strong emphasis on leveraging the capabilities and resources of other donors, the private sector, NGOs, and communities. Additionally, USAID collaborates directly with other U.S. Government agencies on a range of sector-specific activities to bring necessary and valuable expertise to the field.

Since launching the Initiative over two years ago, USAID has made significant progress meeting its climate change objectives. This report highlights a representational cross-section of USAID's activities around the world and the results achieved during 1999.

Protecting Carbon Sinks through Forest Conservation and Land Use Management

One of the greatest concerns for developing countries is the rapid destruction of their tropical and temperate forests. Current estimates indicate that every year between 5 million and 17 million hectares of forests are cleared worldwide.⁹

These forests play a critical role in maintaining much of the world's biodiversity, providing valuable natural resources, and absorbing and retaining atmospheric carbon. Expansion of slash-and-burn agriculture, clearing areas for cattle ranching, new settlements, and unsustainable logging practices have all contributed to deforestation and have eliminated large tracts of the world's carbon sinks. It is estimated that land use changes to forests annually contribute approximately 20 percent of global carbon emissions.¹⁰

A key goal of the Climate Change Initiative is to conserve and protect carbon stocks while also promoting sustainable forest management and biodiversity. In 1999, USAID forestry and land management programs protected or conserved more than 55 million hectares of natural and managed areas, and initiated over 360 policy advances as well as 320 capacity building activities involving over 275 organizations. Provided below are recent highlights of USAID's efforts to support local and national authorities, communities, and NGOs with the technical capability, expertise and information to manage forest and agricultural areas more sustainably.

Forest Conservation and Reforestation. USAID is taking steps to address rapid deforestation in the Amazon tropical rain forest of Brazil—one of the largest carbon sinks in the world—where, according to USAID, about 14 percent of the original forest — about 55 million hectares — has been destroyed since 1970. The USAID mission in Brazil has stepped-up efforts to strengthen local institutions, support research, and improve forest management and agricultural practices. USAID-funded scientists have conducted new studies using satellite imagery to analyze deforestation trends and better understand specific risks from drought, illegal logging, accidental fires, and agriculture practices.

According to USAID reports, unsustainable forestry and land use practices in Mexico account for a third of the nation's carbon dioxide contributions. USAID's support for the Parks-in-Peril Program (see Box 1) has helped protect over 1.75 million hectares of forest in Mexico by strengthening legal protections and providing equipment and training for park managers in 11 national parks and bioreerves. Together with the U.S. Department of Energy, USAID recently funded a study to examine the possibility of providing long-term financial sustainability for forest management, agroforestry, and conservation efforts in Mexico's Calakmul Biosphere Reserve through the use of market-based mechanisms.

In support of conservation efforts in Bolivia, USAID has worked with Bolivian authorities and NGOs to address threats from illegal settlements and agricultural clearing. For example, USAID is the principal donor providing assistance and training to the Izoceno indigenous group to help them improve management of the 3.4 million-hectare Kaa Iya del Gran Chaco National Park. Last year, over 600 hunters from 23 communities participated in 38 workshops to determine how to apply new research in local management efforts. USAID helped incorporate an environmental education program into the local school curriculum, and helped prepare the park's first management plan, expected to be implemented beginning this year.

Working in close collaboration with Russian NGOs, USAID has promoted conservation and reforestation initiatives in the Russian Far East and Siberia by establishing forest protection

legislation and "green accounting" practices, while also supporting forest education, fire prevention, and pest control. One of the key successes of USAID's program in Russia has been its comprehensive reforestation program in Khabarovsk Krai, where high-quality seedlings are produced and replanted in areas that could not previously be reforested due to prohibitively expensive coniferous species. Prior to the program, the greenhouses produced 6,500 seedlings annually. In 1999, the greenhouses generated 2.5

Box 2. The Growing Menace of Forest Fires

Forest fires pose a particularly significant threat to climate change, both by causing additional loss of carbon stocks and by releasing carbon into the atmosphere. Tropical forest fires caused by agricultural clearing have been particularly severe in recent years. During the 1997-98 season in Indonesia, for example, fires were reported in 23 of Indonesia's 27 provinces, in an area totaling over 10 million hectares. Fires blanketed the entire region in haze, affecting about 70 million people and reaching as far away as Thailand and the Philippines. (See World Resources Institute, *Trial by Fire* (2000).) To address the growing crisis of forest fires, USAID has been working in Latin America, Asia, Africa, and the Russian Far East to strengthen fire preparedness and prevention capabilities of governments, NGOs, and local communities.

Following the 1997 and 1998 wildfire disasters in Mexico, USAID, the Government of Mexico (GOM), and local NGOs jointly developed a wildfire prevention and land restoration program to mitigate environmental, health, and climate effects from forest fires. USAID helped lead several efforts to adopt policies discouraging slash-and-burn agriculture, and provided training on fire prevention and wildfire management. As a result, local fire brigades were able to control and extinguish fires much more effectively, and in 1999 Mexico experienced a pronounced decrease in the area normally affected by fires. More recently, USAID and the GOM have been working together to assess the amount of carbon potentially sequestered as a result of the GOM's fire restoration efforts. The purpose of this last project is to assess the technical and methodological issues surrounding the measurement of carbon at wildfire sites that are being restored. Similar support for fire fighting training and improved forest policy in Guatemala helped keep the total area affected by fire at a minimum in 1999. As a result, only 2,600 hectares burned in 1999 in the 3 million-hectare National Park system, an area representing just 1 percent of the total area affected by fires in 1998.

With assistance from USAID, the Indonesian government enacted new requirements to extinguish coal seam fires, a dramatic change from the previous policy that let fires burn uncontrolled. This new policy has led to an increased awareness and reporting of fires, and caused 79 coal seam fires to be extinguished in Indonesian Borneo in 1999. Since then, the Ministry has continued to put out fires without additional USAID assistance.

In Madagascar, USAID has used satellite imagery technology to identify night fires and verify on-going activities to reduce slash-and-burn agriculture. These efforts are already having an impact in areas of key biodiversity habitats, and playing an important role in understanding Madagascar's contribution to global carbon sequestration.

million seedlings, and up to 10 million trees are expected to be produced annually by 2005 under the program.

Promoting Community-Based Forest Management.

Local communities that live in or near forests and use forest resources on a daily basis can be instrumental in protecting forests by monitoring forest conditions and managing resources in a manner that meets their own needs and maintains forest health. USAID has extensive community-based forest management activities worldwide. In the Philippines, USAID assisted in transferring over 625,000 hectares of forest to local management by working with local communities to establish clear boundaries for community management, control agricultural clearing, and establish and implement local management and monitoring plans. After four years, about 5.5 million hectares of forestland—over 60 percent of the country's open access forests—are now under community management. Without such interventions, the country's forest cover would have declined by an estimated 6 percent in the same period.

In Indonesia, USAID is strengthening the management rights of local indigenous peoples by helping communities to map local resources, control local logging, and limit agricultural expansion on local lands. Indonesian officials have increasingly relied on indigenous communities to manage park areas, such as in Lore Lindu National Park, where the local community has already proven to be more effective than the park rangers in keeping illegal loggers and poachers from operating in their part of the national park, comprising over 220,000 hectares of forestland.

Other countries have achieved similar success, such as Nepal, where over 125,000 hectares of forest have been transferred to 1,600 newly-trained Community Forest User Groups, and in rural Madagascar, where 36 community-based associations have been granted authority to manage over 225,000 hectares of critical forest lands. In Guatemala, USAID is expecting by 2001 to have helped shift management responsibilities to local groups for nearly 300,000 hectares of the Maya Biosphere Reserve (MBR). Local communities now actively manage about 5 percent of these lands, while monitoring and protecting the remainder from illegal uses.

Sustainable Agriculture and Agroforestry. USAID is taking steps to capitalize on highly promising improvements in agricultural practices that help sequester carbon. Activities such as agroforestry, conservation tillage, crop rotation and residue management, land restoration and conversion, improved water management, and soil fertility management planning have increased both soil carbon content and agronomic productivity of cropping and pasture systems. Many of these practices also contribute to crop productivity gains and preservation of valuable agricultural or wooded lands.

USAID has worked throughout Uganda and Madagascar to support sustainable farming systems and agroforestry to improve agricultural output while enhancing carbon storage in agriculture. Comprehensive approaches employed include tree, shrub, and grass boundary planting to retain soil, increase water infiltration, and expand hectares under perennial vegetation. This work has included training in composting and mulching, as well as the construction and use

of biogas converters and fuel-efficient stoves for household use.

Rice paddies have also been important targets for reducing carbon emissions. In Bangladesh, USAID is helping to combine fertilizer efficiency and reduced tillage techniques to reduce nitrous oxide emissions from rice paddies. Leaving straw mulch in paddy rice prevents paddy water from turning acidic, which reduces the amount of ammonia fertilizer in the water. This reduces GHG emissions from the paddy and also avoids the need for additional fertilizer.

Working in Albania, USAID supported efforts to improve degraded lands through the demonstration and extension of sustainable agroforestry technologies. USAID's demonstration and training project has led to broad replication of new agroforestry techniques in over 20,000 hectares of forestlands throughout Albania's farming community without additional USAID assistance.

Reducing Emissions from the Energy Sector, Industries & Cities

In most economies, the energy sector is the engine for development. Current global carbon emissions from the energy and industrial sectors, and cities—over 6 billion metric tons per year—considerably exceed the ability of the world's forests and other carbon sinks to absorb carbon.¹¹ The Climate Change Initiative is committed to working in these areas to reduce GHG emissions, while also reducing pollution and conserving energy.

In 1999, USAID programs helped avoid the equivalent of about 2.7 million metric tons of carbon. USAID's efforts included support for over 170 policy advances to promote energy efficiency, renewable energy, and clean energy production, and over 140 capacity building activities involving 516 institutions.

Power Sector and Tariff Reforms. Strengthening the power sector through utility restructuring, or regulatory reforms that include adjustments to energy tariffs and fuel pricing, can provide important benefits such as improving market efficiency, encouraging cost-effective management, and reducing overall GHG emissions. Support to regulatory authorities has been an important step in making energy production and delivery more sustainable. USAID has worked worldwide to help energy providers operate more independently and efficiently, and improve management, financial viability, and infrastructure planning. In India, for example, USAID helped establish several new state-level utility Regulatory Commissions, which are already reviewing new applications for targeted tariff reforms. In Bangladesh and South Asia, USAID supports new energy programs that promote gas and power sector restructuring, regulatory reforms, and regional cooperation in energy trade. In Moldova, USAID assistance helped de-monopolize the energy sector and pass legislation to authorize privatization of individual power plants, while resetting electricity tariffs to cost recovery levels.

USAID has also made significant strides in enhancing power station efficiency, reducing losses in power stations and transmission, and introducing more effective metering and

billing programs. By reducing wasteful energy generation, transmission, and consumption, these efforts have significantly reduced GHG emissions. Under its Global Climate Change Program in the Philippines, for example, USAID has catalyzed the natural gas industry to offset coal-fired power plants and introduced power sector reforms that will reduce GHG emissions by 20 million metric tons by 2003 with no adverse impact on economic growth. USAID has also succeeded in bringing down GHG emissions by helping convert energy industries in a number of countries from state-owned to market-driven enterprises. In 1999, training in project financing and performance contracting in Romania, for instance, has led to efficiency gains that reduced GHG emissions and saved 100,000 MWh of power.

Managing energy demand is a key approach to reducing wasteful energy consumption and lowering GHG emissions. In Indonesia, USAID's work with the Ministry of Mines to address energy subsidies led to a government plan to increase the price of electricity by 29 percent and petroleum products by 12 percent. In India, USAID recently assisted the government to develop a new Energy Regulatory Reform Act which will reduce power subsidies, promote tariff reform, and encourage investments in biomass/bagasse-based cogeneration in most Indian states.

Renewable Energy. As developing country economies continue to expand, many countries have the opportunity to adopt advanced technologies, including a growing variety of renewable applications in wind, solar, hydro, or biomass energy. In 1999, renewable energy programs implemented under the Initiative helped avoid the equivalent of over 1 million metric tons of carbon dioxide emissions that otherwise would have been produced through the burning of fossil fuels.

USAID has helped improve access to renewable technologies through technical assistance and training, demonstrations, and targeted policy interventions. For example, USAID has worked closely with the Government of Brazil to implement several new laws providing federal incentives to electric utilities investing in renewable energy technologies. USAID's efforts in Brazil also include deploying decentralized renewable energy systems to remote off-grid areas.

USAID's efforts in Mexico involve a combination of support for renewable technology markets, rural electrification with renewable systems, and improved national renewable energy planning. USAID plans to provide technical assistance to design a national-scale rural electrification program to provide renewable power for schools and health clinics, and to provide potable water. Last year alone, USAID helped install over 100 renewable energy systems in Mexico that will generate over 8,600 MW-h of electricity over their lifetimes—displacing additional fossil fuel-based power generation.

Several renewable energy projects in Asia have made progress in implementing and marketing solar, wind, and hydro resources. USAID has provided technical assistance and training in India, the Philippines, and Nepal to promote low-cost solar-powered water pumping and purification systems.

Box 3. Expanding Markets for Climate Technologies

USAID recently released a report predicting dramatic growth over the next ten years for climate change mitigation technologies and services in developing country markets. According to the report, by 2010 this market is expected to grow from \$29.9 billion today to as much as \$64.9 billion. The largest market share will be in Asia, accounting for 55 percent of the total, followed by Latin America, Africa, the Middle East, and Eastern Europe. The market expansion results largely from the growing belief in many developing countries that leaner productivity and greater efficiency are critical for economic success. Fifty-three percent of the growing market demand in climate-friendly technologies will be in the energy sector, as a result of mounting energy demands and growing interest in efficiency, renewables, and cleaner fuels. Technologies for the commercial and residential sectors such as efficient lighting, energy conservation in buildings, appliances, and air conditioning represent 26 percent of the market, while the industrial sector represents 11 percent.

Energy Efficiency. USAID has made tremendous progress in advancing energy efficiency technologies and practices that reduce GHGs emissions while promoting cost savings, conserving resources, and reducing local pollution. In 1999, USAID helped avoid the equivalent of over 1.6 million metric tons of carbon dioxide emissions through energy efficiency programs under the Climate Change Initiative.

USAID is working in Egypt to support the adoption of a National Energy Efficiency Strategy and, under a public-private energy efficiency council, financial sector reforms that would encourage productive investments in energy efficient technologies. The new strategy is projected to create a \$2 to \$3 billion market in energy efficiency goods and services and significantly decrease Egypt's GHG emissions.

In Mexico, USAID's Steam and Combustion Efficiency Pilot Project has promoted high efficiency motors, compressors, pumps, and lighting to demonstrate the linkages between reducing emissions and increasing energy efficiency. In 1999, this effort resulted in a reduction of more than 325,000 metric tons in carbon dioxide emissions.

In Ukraine, in cooperation with the U.S. Department of Energy (DOE), the Pacific Northwest National Laboratory, and the NGO Arena-Eco, USAID has supported efforts to identify and implement energy efficiency opportunities in six industries. To date, participating industrial plants have invested \$1.2 million of their own funds in new energy efficiency technologies, demonstrating long-term commitment to adopting efficiency measures and recognition of the important cost-saving opportunities of more sustainable industrial practices.

Clean Energy. A number of USAID projects have made climate change an important focus of clean energy initiatives. Under the West African Gas Pipeline Project, for example, USAID has worked with energy officials in Nigeria, Togo, Benin, and Ghana to develop a new natural gas pipeline to alleviate the region's recent regional energy crisis. Promoting close collaboration between government and private sector partners, the project is expected to provide more reliable access to electricity while reducing GHG emissions from the gas flaring in Nigerian oil fields.

Box 4. Climate Change and Urbanization

As cities of the developing world continue to undergo rapid industrialization and population growth—creating additional strain on overburdened municipal resources, infrastructure, and services—they will contribute an increasing portion of the world's GHG emissions. Covering just 2 percent of the Earth's surface, cities account for roughly 78 percent of the carbon emissions, from motor vehicles, industrial activity, electricity use, and municipal waste.¹ Many cities are also vulnerable to climate impacts, such as more frequent and intense storms and floods, water shortages, rising sea levels, and population migration. Coastal megacities are particularly at risk to sea level rise, which may reach as much as 95 centimeters by 2100.¹ Destructive weather such as Hurricane Mitch or recent flooding in India, Mozambique, and Venezuela may occur with greater frequency. Coupled with poor sanitation, increased flooding may likewise hasten the spread of disease and related health risks.

As urbanization and other development challenges continue to grow, cities will increasingly become political, economic, and environmental focal points for implementing climate-friendly solutions. With increased devolution of government authority, cities will provide key leadership in addressing urbanization with many of the same cost-saving solutions that address climate change. USAID has taken action on several fronts to work with developing country municipalities to identify strategic and technological approaches to mitigate GHG emissions from motor vehicles, industries, buildings, and municipal operations, and to begin to understand the risks of climate impacts and key approaches for adapting to climate variability.

Sources:

Molly O'Meara, *Reinventing Cities for People and the Planet*, *WorldWatch Paper 147* (June 1999), 7.

Secretariat of the United Nations Framework Convention on Climate Change, *Climate Change Information Sheet 11: Sea levels, oceans, and coastal areas* (January 1997).

A range of other USAID programs have demonstrated important opportunities presented by clean energy in natural gas, biomass cogeneration, industrial and coal bed methane recovery, and cleaner coal. Under the Ukraine Natural Gas Project, for example, USAID and DOE have evaluated the potential for retrofitting and partially replacing 96 inefficient gas supply units in 23 compressor stations along the three main Ukrainian gas pipelines—retrofits that would generate savings of about 800 million cubic meters of natural gas every year. In Bangladesh, USAID is working with the national government to assess the country's natural gas reserves and the feasibility of gas and power exports. In 1998 in India, USAID helped promote industrial use of bagasse/biomass fuels, including six sugar mills that have generated over 330 million KWh annually in co-generated energy. The annual carbon dioxide emissions avoided in 1998 through this project was over 0.5 million tons. Since then USAID has promoted wider use of cleaner coal technology and helped design India's first coal washing facility.

Industrial Emissions. Considerable opportunities exist in industry to mitigate GHG emissions while simultaneously improving overall efficiency and productivity, and promoting the adoption of cleaner production practices and environmental management systems. In Mexico, for example, USAID and DOE are working to develop GHG emissions

benchmarks for key industries, as well as energy efficiency initiatives in the public sector. To date, USAID's efforts in Mexico have demonstrated that investments in resource management systems (RMS) are technically sound, and pay for themselves through energy and other savings in a few months to a few years.

USAID has also supported the adoption of environmental management systems in energy-intensive industries. In the Philippines, USAID supported the adoption of ISO 14000 certification—a voluntary system that promotes environmental management improvements in production practices—at a Ford Motor Company plant and throughout its chain of 38 suppliers. Fujitsu Ten Corporation (Philippines) followed Ford's lead and recently announced plans to change its purchasing practices and raise awareness among its own suppliers. In Chennai, India, USAID worked with a starch manufacturing company to recover methane emissions from their tapioca-processing effluents. With USAID assistance, the local chamber of commerce implemented a demonstration project converting the recaptured methane for fuel use, an achievement that was recognized with the 1999 “Energy Project of the Year-International” award from the Association of Energy Engineers—the world's largest international association of energy and environmental professionals.

Helping Cities Respond to Climate Change. USAID recognizes the important linkages that exist between promoting sustainable urban development and addressing climate change—both in terms of mitigating emissions and reducing vulnerability. (See Box 4.) The centerpiece of the Agency's global strategy to address climate change and urbanization is Cities for Climate Protection, a program designed to assist developing country municipalities to meet prevailing social and economic development challenges through “no regrets” approaches that reduce the urban contribution to climate change. In partnership with the International Council on Local Environmental Initiatives (ICLEI), USAID is working with local governments and private industry to support policy reforms, training, demonstration projects, emissions inventorying, setting of local emissions reduction goals, and public-private partnerships. To date, USAID has worked with 11 cities in Mexico and the Philippines, and is currently launching new partnerships in Indonesia, India, and South Africa.

Several USAID programs seek to reduce GHG emissions from motor vehicles while also reducing lead, particulates, and smog-forming emissions. In Egypt, USAID's Cairo Air Improvement Program includes a vehicle emissions testing program that promotes greater fuel efficiency. Owners of vehicles that fail the test are given information on tune-up benefits and service locations. It is estimated that if recommendations are implemented, fuel savings of 17 percent could be achieved per vehicle. To date, over 25,000 vehicles have been stop-tested, and USAID expects as many as 1.3 million to be tested under the program by 2002. USAID launched another vehicle testing activity in India through a public private partnership. This partnership supported inspection and maintenance for over 65,000 drivers of Delhi's two-wheelers, collecting emissions and vehicle data that may be used in supporting voluntary programs and compliance with future emissions regulations.

One of the most important and often overlooked opportunities to avoid energy costs—as well as GHG emissions—has been in building efficiency. Under two “eco-homes” projects in South Africa, USAID helped construct 1,470 energy efficient homes, saving over 200 metric tons of carbon dioxide per year by reducing the need for heating fuels. These homes serve as important models in a country undergoing tremendous housing development. To further the benefits of these homes, USAID supported the establishment of a network for sharing technical expertise and awareness, as well as a “Green Professionals” program, providing technical aid to housing builders to ensure that energy efficiency design is utilized.

Under the Lviv Municipal Energy Efficiency Project in Ukraine, USAID funded a demonstration project to weatherize and install heat controls at a boarding school for children with cardiovascular disease, providing both considerable savings for the school and avoiding 120 tons of carbon dioxide emissions. USAID’s partners have conducted a number of energy audits for other municipal buildings in Lviv, and organized a strategic planning workshop for the city’s district heating companies. USAID has already begun replicating its successes in Lviv in five other Ukrainian cities.

Promoting Developing and Transition Country Participation in the UNFCCC

Advancing a global solution to climate change requires participation by all Parties to the UNFCCC. A key component of the Climate Change Initiative is to increase developing and transition country participation in the UNFCCC through targeted policy reform and capacity building activities. Over the last year, the Agency implemented over 50 capacity building activities that focus on such areas as: integrating climate change into national development strategies; establishing emissions inventories; developing national climate change action plans; promoting procedures for receiving, evaluating, and approving joint implementation proposals; and establishing growth baselines for pegging greenhouse gas emissions to economic growth. Below is a brief summary of some of USAID’s activities in this area.

Strengthening Participation. Through the USAID Climate Change Center in Ukraine, established in 1999, USAID provides support to the Government of Ukraine to strengthen capacity in establishing national administrative structures, developing a national climate change inventory program, and preparing investment projects. In preparation for the 6th Conference of the Parties (COP-6) to the UNFCCC, USAID has provided assistance to the Government of Kazakhstan to analyze the costs and benefits of GHG abatement and to continue preparing its national emissions inventory. Through the U.S. Country Studies Program (USCSP), USAID assisted the Philippines in developing a national action plan in 1999 that inventories GHG emissions, assesses vulnerability, and recommends mitigation strategies. With USAID assistance, the Confederation of Indian Industry, the largest trade association in India, established the Climate Change Information Center to facilitate climate investment. Through the Energy and Environment Training Program, USAID offered targeted climate change training on the economics of

Box 5. Joint Implementation

USAID works to strengthen developing and transition country participation in the UNFCCC by promoting involvement in Activities Implemented Jointly (AIJ), a concept adopted in Article 4.2(a) of the UNFCCC, which provides for Parties to meet their obligation to reduce greenhouse gas emissions “jointly with other parties.” In 1993, the U.S. announced a pilot joint implementation program, the U.S. Initiative on Joint Implementation (USIJI), as part of the U.S. Climate Change Action Plan.

USIJI encourages U.S. businesses and NGOs to voluntarily use their resources and innovative technologies and practices to reduce greenhouse gas emissions and promote sustainable development worldwide. Voluntary international partnerships offer the potential to achieve greater and more cost-efficient emission reductions worldwide than would be possible in each country alone. The USIJI now includes 51 projects in 25 countries, representing a diversity of technologies that range from energy efficient homes to power plant conversions. The projects are reviewed and selected by an evaluation panel comprised of senior representatives from eight federal agencies, including USAID.

USAID promotes participation in USIJI either directly or indirectly through institutional strengthening and technical assistance activities. This year USAID and the Department of Energy jointly undertook an effort to promote the development of up to six AIJ projects in Africa. Such assistance included a workshop held in Botswana in April 2000, which provided hands-on training for African project developers. Key technical issues addressed at the workshop include: developing baseline assessments for carbon emissions; estimating emission reductions attributable to the project; assembling the material into a format consistent with USIJI criteria and guidelines; and developing and implementing strategies for host country approval. Likewise, USAID is assisting the Interagency Climate Change Center in Kazakhstan through the Greenhouse Gas Emissions Reduction Initiative (GGERI) to develop a framework for conducting a national Joint Implementation (JI) program and to build institutional capacity for tracking greenhouse gas credits.

climate change in 13 countries worldwide. USAID, in conjunction with USCSP, also sponsored a workshop in Dakar, Senegal to provide technical training and capacity-building in climate change assessment to field engineers and technicians from Benin, Burkina Faso, Central Africa Republic, Chad, Cote d'Ivoire, Guinea, Guinea Bissau, Gambia, Niger, Senegal, and Togo.

Technology Cooperation. USAID plays a leadership role internationally promoting the diffusion of climate friendly technologies to developing and transition countries in pursuit of the objectives of Article 4.5 of the UNFCCC. Through work with governments, environmental groups, and the private sector, USAID implements activities worldwide that include human and institutional capacity building, demonstration projects, information dissemination, investment facilitation, research, and regulatory and technical barrier removal. Together with the U.S. Department of Energy and Environmental Protection Agency, USAID has supported a pilot project that has emerged as a model for technology transfer under the UNFCCC (see Box 6).

Box 6. Technology Cooperation Agreement Pilot Project (TCAPP)

In partnership with the U.S. Environmental Protection Agency and the U.S. Department of Energy, USAID implements the Technology Cooperation Agreement Pilot Project (TCAPP), a global effort to promote the transfer of climate technologies to developing countries. Working in Brazil, China, Kazakhstan, Korea, Mexico, Egypt, the Philippines, and the Southern Africa Development Community, TCAPP has emerged as the leading model for private-sector driven technology transfer under the UNFCCC.

Under TCAPP, country teams develop technology cooperation frameworks that identify priority climate-friendly technologies that will meet development goals and reduce GHG emissions. In addition, the technology cooperation frameworks identify potential barriers to the deployment of these technologies. TCAPP then works with in-country government agencies, businesses, and NGOs, to develop and implement actions that will remove barriers and facilitate technology transfer. A key element of TCAPP has been attracting private investment. TCAPP actively engages over 400 U.S., international, and local businesses to help develop specific projects and to provide invaluable input regarding the removal of market barriers. Over 10 bilateral and multilateral donors also are working with USAID in this initiative.

Specific recent accomplishments related to the development of new projects and policies include facilitating the development of at least 13 new clean energy business investment projects in the participating countries and initiating work on over 10 additional prospective projects. If these projects are fully implemented, they will result in up to \$100 million of new investment deals and reductions in GHG emission of up to 200,000 tons of carbon per year over the lifetime of the projects. TCAPP is also facilitating 22 actions to remove energy market barriers, including renewable energy policy reforms in the Philippines, development of an industrial ESCO pilot program in Mexico, a sugar mill cogeneration financing workshop in Brazil, energy auditing training in Korea, and the development of refinery energy efficiency pilot projects in Egypt.

Vulnerability and Adaptation

USAID supports a large number of projects that help developing countries respond to climate change impacts across a range of sectors, including agriculture, water resources, health and forestry. Additionally, USAID is beginning to explore the short-term consequences of climate change on disaster preparedness.

Facing drought and food security challenges, countries in sub-Saharan Africa are among the most vulnerable to climate change. In South Africa, USAID is implementing a range of capacity building and disaster relief projects that address vulnerability to drought and loss of biodiversity. In the water sector, USAID is helping to build in-country capacity to prepare for and adapt to climate change impacts as part of ongoing efforts with the South African government to improve management of water services in Mpumalanga Province, a severely under-served area. Likewise, capacity building of the Bushbuckridge Water Board has already increased its capacity to better manage water services to over a million residents. In Central Africa's Congo Basin, USAID is

implementing a 5-year forestry and biodiversity program that addresses vulnerability of tropical rainforest species.

USAID has also dedicated significant attention to small island states at risk from sea level rise, perhaps the most visible long-term impact of climate change and possibly nation-threatening in the case of these countries. USAID is supporting a wide range of on-going training efforts on vulnerability to rising sea level, including a recent workshop in the Marshall Islands in collaboration with the Alliance of Small Island States (AOSIS).

As shown by the devastation of Hurricanes Mitch and Georges in 1998, natural disasters can have severe long-term environmental, economic and social consequences for developing countries. In the wake of Hurricane Mitch, USAID has joined a multi-agency effort to strengthen worldwide climate-related disaster preparedness and mitigation, particularly in Mexico and Central America. In particular, USAID established a training and technical assistance program with the Central American Center for the Prevention of Natural Disasters to develop adaptation plans for extreme climatic events. USAID has also supported energy sector reconstruction efforts designed to enhance the capability of the Central American energy facilities to survive catastrophic weather events, while at the same time promoting environmentally sustainable energy use.

¹ Intergovernmental Panel on Climate Change (IPCC), *Climate Change 1995: IPCC Second Assessment Report* (1995).

² *Vital Signs 2000*, WorldWatch Institute (2000), 67.

³ U.S. Department of Energy, *International Energy Outlook 2000* (2000), <http://www.eia.doe.gov/oiaf/ieo/index.html>.

⁴ See H. Josef Hebert, Associated Press, "Global Warming Theory Affirmed," *The Washington Post* (October 26, 2000), A18.

⁵ Between 1990 and 1998, carbon emissions from developing countries increased by 34 percent. *Supra* note 3.

⁶ *Supra* note 3.

⁷ *Id.*

⁸ *Supra* note 2, at 66.

⁹ World Resources Institute, et al, *World Resources 2000-2001*, 90. By comparison, the size of Austria is approximately 8.3 million hectares. (One hundred hectares is the equivalent of one square kilometer.)

¹⁰ *Id.* at 48.

¹¹ *Supra* note 2, at 20.

Additional Information

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